Venous Access: Intraosseous

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Clinical Indications:

- Patients where rapid, regular IV access is unavailable with any of the following:
- Cardiac arrest.
- Multisystem trauma with severe hypovolemia and/or a significantly burned patient with no IV access.
- Severe dehydration with vascular collapse and/or loss of consciousness.
- Respiratory failure / Respiratory arrest.
- Any other immediately life-threatening, peri-arrest clinical condition in which IV access is unobtainable. When in doubt, contact medical control for advice.

Contraindications:

- Suspected Fracture at or proximal to proposed intraosseous insertion site.
- History of Osteogenesis Imperfecta
- Current or recent infection at proposed intraosseous insertion site.
- Previous intraosseous insertion or joint replacement at the selected site.

Insertion Procedure:

1. Don personal protective equipment (gloves, eye protection, etc.).
2. Approved Intraosseous Insertion Sites:
   Adult Patients: Proximal Humerus and Proximal Tibia
   Pediatric Patients: Proximal Tibia
   [Note: The preferred intraosseous site for fluid and drug administration in patients with lower extremity or pelvic injuries is the proximal humerus. Fluids given through the proximal humerus reach the central circulation via the superior vena cava, thereby bypassing pelvic and abdominal vasculature.]
3. Identify appropriate insertion site.
   Proximal Humerus: On an adducted arm with a flexed elbow and an internally rotated humerus, approximately 1 to 2 cm above the surgical neck, on the most prominent aspect of the greater tubercle.
   Proximal Tibia (Adult): On an extended leg, approximately 2 cm medial to the tibial tuberosity, or approximately 3 cm (two finger widths) below the patella and approximately 2 cm medial, along the flat aspect of the tibia.
   Proximal Tibia (Pediatric): On an extended leg, approximately 1 cm medial to the tibial tuberosity, or just below the patella (approximately 1 cm or one finger width) and slightly medial (approximately 1 cm or one finger width), along the flat aspect of the tibia.
4. Prep the selected site with a providone-iodine or chlorhexidine solution.
5. Appropriate needle angle:
   Proximal Humerus: Aim the needle tip at a 45-degree angle to the anterior plane and posteromedial.
   Proximal Tibia (Adult) and Proximal Tibia (Pediatric): Aim the needle tip at a 90-degree angle to the center of the bone.
   Proximal Tibia (Pediatric): Aim the needle tip at a 90-degree angle to the center of the bone, aimed away from the nearby epiphyseal plate.
6. Push needle tip through the skin until tip rests firmly against the bone. The 5 mm mark from the hub must be visible above the skin for confirmation of adequate needle set length.
7. Power the driver until a “pop” or “give” is felt indicating loss of resistance. Do not advance the needle any further! [Note: Avoid recoil, do NOT pull back on the driver when releasing the trigger.]
8. Remove the stylet and place in an approved sharps container.
9. Stabilize and secure the needle with the specified dressing included in the packaging.
10. Verify needle placement. a) Needle feels secure. b) Attach a syringe filled with at least 5 ml NS; aspirate bone marrow
11. Inject at least 5-10 ml of NS in an adult or 2-5 cc of NS in a pediatric patient to clear the lumen of the needle and open the intramedullary space.

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12. Attach the IV line and adjust flow rate. A pressure bag may assist with achieving desired flows.
13. Re-verify placement prior to each infusion and assess frequently for complications, including extravasation which can lead to compartment syndrome. Following the administration of any intraosseous medications, flush the line with IV fluid.
14. Document the procedure, time, and result (success) on the patient care report (ePCR).

Removal Procedure:

1. Remove any extension set and dressing and attach a luer-lock syringe to the hub.
2. While maintaining axial alignment, twist the syringe and catheter clockwise while pulling straight out. Do not rock or bend during removal.
3. Place the catheter into a designated sharps container for sharps containment and disposal.
4. Apply gentle pressure as needed and apply a clean dressing to site.
5. Document the procedure, time, and reason for removal on the patient care report (ePCR).

Certification Requirements:

- Maintain knowledge of the indications, contraindications, technique, and possible complications of the procedure. Assessment of this knowledge may be accomplished via quality assurance mechanisms, classroom demonstrations, skills stations, or other mechanisms as deemed appropriate by the EMS Medical Director.